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Hessian Fly Control with Systemic Insecticides [1]

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THE Hessian fly, *Phytophaga destructor* (Say), is the most important insect pest of wheat over large areas of the United States. This insect was introduced from Europe almost two hundred years ago and, according to the latest available information (1), it is found in Siberia, Soviet Far East, southern Scandinavia and Finland, the British Isles, the whole of Central and South Europe including the Balkans, and North Africa as well as the United States and Canada.

Since 1948 the Missouri Agricultural Experiment Station has been interested in the possibilities of controlling the Hessian fly with insecticides. In that year two chlorinated hydrocarbons, toxaphene and chlordane, were used in exploratory trials against the fall generation of the fly, with encouraging results. Massive rates of these insecticides (8 pounds actual per acre) were applied at the time of fly emergence. The fly population was built up to a very high level by the introduction of heavily infested stubble. No protection was afforded the wheat against the spring generation of fly but the plots treated in the fall yielded approximately 30 percent of an expected crop, while the untreated areas were a total failure. Subsequent tests, however, indicated that chlorinated hydrocarbons would not give adequate protection at feasible dosage levels and attention was turned to the systemics. To the writer's knowledge the results presented below constitute the first report of successful insecticidal control of the Hessian fly. VANIEV (4) in 1951 reported successful control of species of aphids, the frit fly, *Oscinella frit* (L), and *Chlorops pumilionis* (Bjerk.) by what he thought was systemic action following application of parathion to wheat. However, he made no mention of Hessian fly and recent work has not indicated parathion to be a systemic, so that it is probable that other factors were responsible for the control he observed.

Systox, in an emulsifiable concentrate formulation, was used as an imbibing seed soak, a soil soak before planting, and a foliage spray at the time of fly emergence. Initial field tests indicated that all methods of application reduced the fly numbers. However, greenhouse experiments by MR. ELMER JONES, of the Agricultural Research Service, United States Department of Agriculture, at Manhattan, Kansas, and the writer at Columbia, Missouri, under conditions of heavy infestation and prolonged exposure, demonstrated that Systox applied as a seed soak treatment did not possess enough residual action to provide protection to the wheat seedlings.

Work was then undertaken with a longer-acting systemic which, it was hoped, would give the desired protection period. Thimet, in a 44 percent formulation on carbon, was secured from the American Cyanamid Company and in March and April 1956 greenhouse

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[1] Contribution from Missouri Agricultural Experiment Station, *Journal Series* No. 1757. Approved for publication by the Director of the Station.

[2] The writer wishes to express his gratitude to the American Cyanamid Company for providing Thimet materials and especially to MR. J.R.G. SUTHERLAND for his constant collaboration during the course of the study and to DR. E.L. CLARK for arranging for residue analyses, as well as to the Chemagro Corporation for providing samples of Isosystox.

tests were carried out. Three treatment levels of insecticide were used, corresponding to 1.4 pounds, 3.5 pounds and 7.0 pounds of actual Thimet per acre. Twenty-four-inch by eighteen-inch flats were used and each treatment was replicated three times. Three shallow trenches were made in each flat and the weighed samples of insecticide sprinkled in the bottom of each trench; then wheat seed was planted and covered. Missouri Early Premium wheat, a variety susceptible to Hessian fly, was used. The seed was planted 20 March. Flies began to emerge 1 April and oviposition was heavy by 5 April. Counts showed no differences between numbers of eggs on treated versus untreated plants.

All flats were exposed under a cheesecloth infestation tent on the greenhouse bench from 1 April until 20 April, at which time the maggots were large enough to be counted easily.

The results of these tests are shown in Figure 1. These tests provided the first demonstration of powerful insecticidal action against the Hessian fly and an adequate field experiment was planned to confirm the greenhouse findings.

Methods and Materials

A randomized block arrangement was laid out consisting of plots 50 feet × 5 feet, replicated six times. Plots were separated by buffer strips one foot wide. Thimet in a 44 percent formulation and Isosystox in a 50 percent formulation, both on carbon, were used at four insecticide rates plus controls. The application rates were 200, 400, 800 and 1,600 grams of actual insecticide per acre. The controls received no insecticide. The calculated amount of each insecticide was weighed on an analytical balance and then mixed in a concrete mixer with fertilizer and applied at planting with a standard fertilizer attachment on the grain drill. The fertilizer was a 12-12-12 formulation especially mixed for the experiment, using ammonium sulfate as the source of nitrogen. This brought the mixture below pH 7.0 and was intended to prevent chemical degrading of the materials which might occur in an alkaline medium. The fertilizer was applied at 345 pounds per acre to all treatments and controls.

Tenmarq wheat was used because it is highly susceptible to Hessian fly and also is available commercially. The seeding rate was one bushel (approximately 60 pounds) per acre.

The planting date was 6 September 1956, one month before the "fly free date" for Columbia, Missouri. Seedlings began to emerge on 14 September and emergence was complete in all plots by 18 September. No differences were noted between treated and untreated plots which could be attributed to the insecticides, except that in the two plots with heavier Thimet applications the very young seedlings had an abnormal color in the form of a bright yellow ring extending from the ground to about an inch up the stem. Within a week or ten days, however, the discoloration disappeared and no other evidences of possible phytotoxicity were observed.

As wheat had not been grown recently in the experimental area and a low natural infestation was anticipated, stubble which was collected from a heavily infested field in July and stored in a cold room at 36° F., was introduced onto the plots on 15 September. This practice resulted in a satisfactory infestation.

The experimental area had been fallowed since June when it was plowed and prepared for planting, and therefore it had sufficient moisture to bring up the seedlings; but August, September, and October were drought months and the young plants soon began to suffer from lack of moisture. Irrigation was applied by means of a sprinkler system on 18-19 September and again on 15-16 October, at the rate of one acre inch on each date. This supplementary moisture resulted in very satisfactory growth throughout the experiment.

Data on Hessian fly control were obtained during December by counting the number of maggots found in 100 plants taken at random from each plot.

Forage samples were collected on five dates, 12 October, 19 October, 26 October, 2 November, and 28 December, weighed for yield and quick frozen for residue determination. The top growth from one square yard was clipped in each plot on each date. These

samples were placed in pliofilm bags, sealed, and frozen at –30° F. within one hour of collection. The samples were then held at 0° to –10° F. until analyzed for residues.

Results

The control obtained against Hessian fly is shown in Table 1. The results offer strong evidence as to the systemic toxicity of these phosphate insecticides toward this wheat insect and indicate a good possibility of their effective and practical use in field control. Thimet gave better protection than Isosystox. Probably this is due largely to the longer residual period provided by Thimet, although this cannot be supported by direct evidence as the Isosystox residues were not determined due to lack of analytical facilities. Thimet

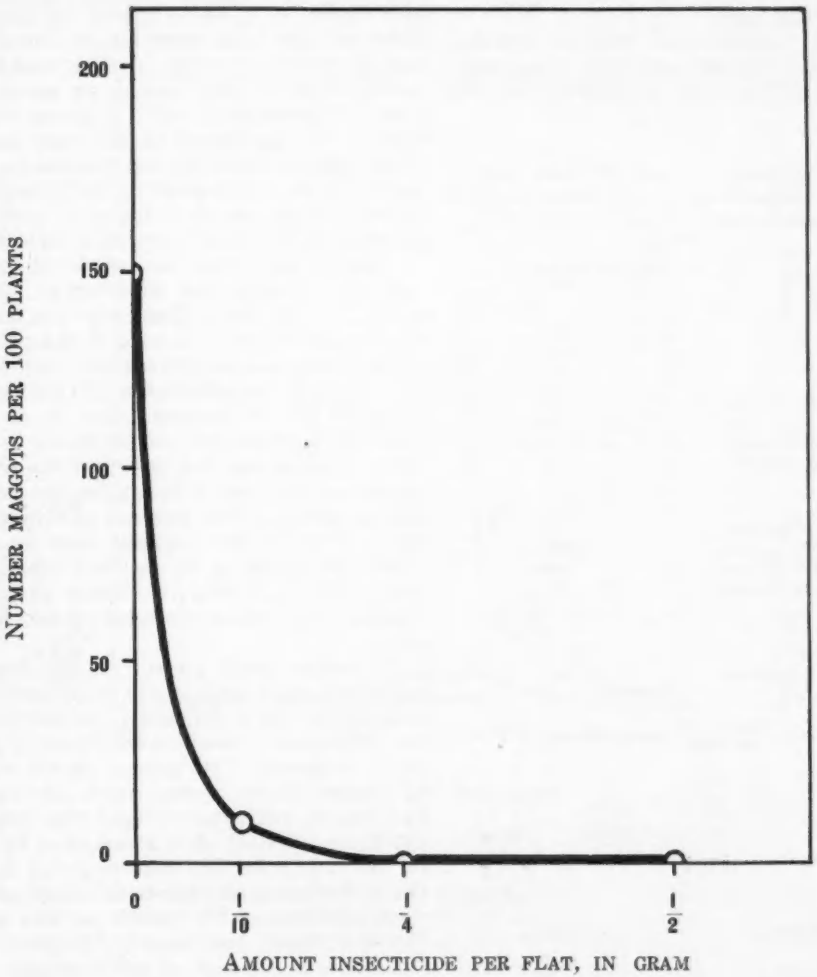

Figure 1. Results of a greenhouse experiment on Hessian fly control with a systemic insecticide, Thimet, May 1956. The insecticide was applied in flats (24 inches x 18 inches) at three levels: 1/10 gram per flat = 1.4 pounds actual per acre; 1/4 gram = 3.5 pounds actual per acre; 1/2 gram = 7.0 pounds actual per acre.

samples were analyzed and the data are presented in Table 3. The erratic results obtained in the case of Isosystox can most probably be explained by assuming that the 200 grams per acre and 800 grams per acre treatments were inadvertently switched. The data from plot to plot were uniform and would indicate that such a transposition could have taken place. It is regrettable that Isosystox residues could not be determined, as such data would aid greatly in clarifying this point.

Figure 2 shows the relation between residue levels for four sampling dates, Hessian fly emergence and oviposition, and the growth of the wheat plants. From these curves it may be seen that on 12 October, which was close to the end of the infestation period, Thimet residues from the 800 and 1,600 gram per acre levels ran about 0.50 p.p.m. in the plants, while at the 200-gram level the residue was 0.025 p.p.m. Inasmuch as Thimet at the 200-gram level reduced the number of maggots to about one half the check and the high levels, 800 and 1,600 grams, resulted in an almost complete elimination of maggots (Table 1), it would appear, by interpolation of the data presented in Figure 2, that in order to provide a toxic level sufficiently high to give control, an amount of Thimet between 0.10 and 0.50 p.p.m. would have to be maintained in the plant tissue. These data also show that toxic residues would have had to be present in the plants for more than five weeks in order to cover the oviposition and larval migration period.

TABLE 1. – *Control of Hessian fly with systemic insecticides, Isosystox and Thimet, obtained in field tests at Columbia, Missouri, 1956.*

Treatment	Number maggots per 100 plants [a]
Control	138.33
Isosystox:	
200 gm/acre	76.33
400 gm/acre	113.00
800 gm/acre	131.00
1600 gm/acre	54.50
Thimet:	
200 gm/acre	62.33
400 gm/acre	23.33
800 gm/acre	2.83
1600 gm/acre	0.33

Analysis of variance:

Source of variance	*Degrees of freedom*	*Mean squares*	*F*
Total	53	—	
Treatments	8	16,525	
Replications	5	1,932	32.30 [b]
Error	40	512	3.77 [b]

Treatments	*Replications*
5 % = 2.18	5 % = 2.45
1 % = 2.99	1 % = 3.51

[a] Average of six replications.
[b] Significant at 1 % level.

Hessian flies were first observed in the field on 1 October and the latest on 12 October. While observations were too limited to give an accurate estimate of the peak, it probably came about 6 October. Some flies undoubtedly oviposited after 12 October but a search on 19 October failed to disclose any flies and the information shown in Figure 2 gives a fair indication of the actual occurrence of Hessian fly during the experimental period. The presence of ovipositing flies on 12 October suggests that maggots would be migrating to the leaf sheaths at least until 15 October. This is shown in Figure 2 as a clear extension of the histogram.

Increased plant growth on the treated plots was noted early in the experiment and was definite on 2 November, at which time the wheat was in excellent condition for grazing or chopping. The general growth curves of treated plants versus check are shown in Figure 2, where the average forage yield of the Thimet treated plots is compared to that of the checks for the four sampling dates. On 2 November the yields of forage of the checks averaged 5,373 pounds per acre while the best Thimet treatment (1,600 grams per acre) gave an average of 8,272 pounds or a net gain of 2,899 pounds of forage. Wheat planted on the "fly free date" (6 October) probably would not have yielded more than 500 pounds per acre by 2 November. This

last estimate was obtained by assuming that the growth curves of wheat planted on 6 September and 6 October would be similar, in which case wheat planted on 6 October would be expected to yield 500 pounds of forage by 2 November.

Table 2 gives data on yields of forage on 2 November. Growth differences decreased rapidly after the 2 November sampling and by 28 December there was no significant difference between treated and untreated plots. Both Isosystox and Thimet increased growth about equally. There was a significant difference between the lowest and highest rates but not between materials at any dosage level. WÄCKERS (5) and SWARTFÜCHTBAUER (3) have presented data which show that increased yield is not to be expected from applications of phosphoric esters either by direct phytophysiological effect or by an indirect action on the microbiology of the soil.

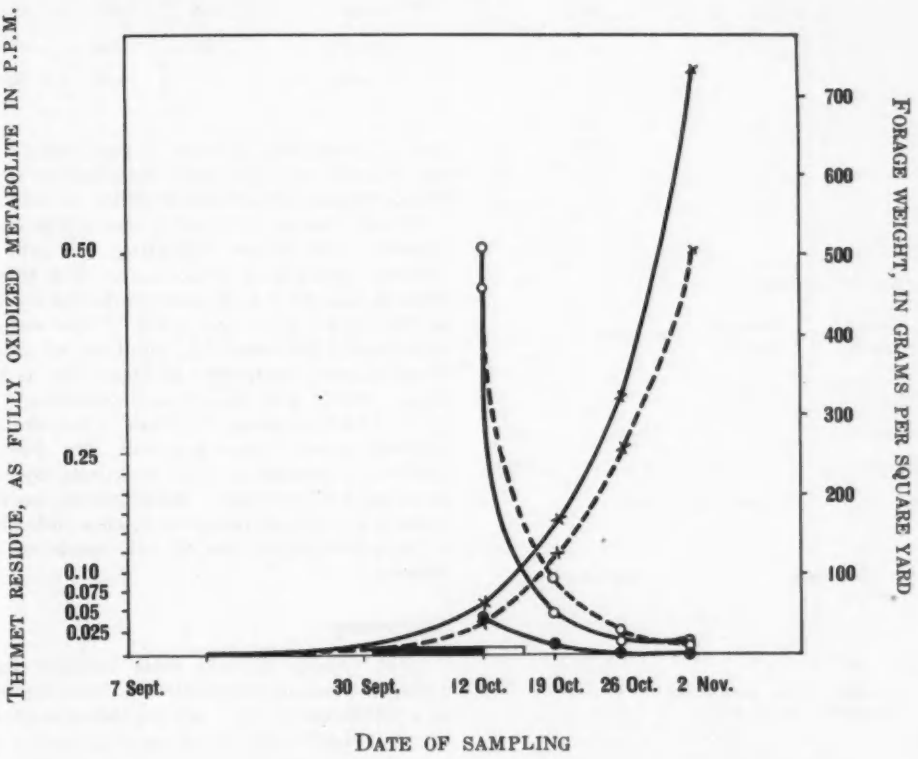

Figure 2. Residue levels of Thimet in relation to Hessian fly emergence and wheat growth, based on results of field tests at Columbia, Missouri, 1956. ●—● Thimet at 200 g. per acre; O - - O Thimet at 800 g. per acre; O — O Thimet at 1,600 g. per acre; ×—× Average forage weight of Thimet-treated plots; ×- - -× Average forage weight of checks; ▬▬ Fly emergence period, the clear extension of the histogram indicating the extended period of maggot migration.

TABLE 2. – *Forage yields of wheat following treatment with Isosystox and Thimet, based upon data obtained on 2 November 1956, at Columbia, Missouri.*

Treatment	Wet weight of forage in grams per sq. yd. [a]
Control	504.4
Isosystox:	
200 gm/acre	708.6
400 gm/acre	619.2
800 gm/acre	772.6
1600 gm/acre	697.7
Thimet:	
200 gm/acre	728.3
400 gm/acre	680.0
800 gm/acre	707.8
1600 gm/acre	775.9

Analysis of variance:

Source of variance	*Degrees of freedom*	*Mean squares*	*F*
Total	53	—	
Treatments	8	14,775	3.20 [b]
Replications	5	23,219	5.02 [b]
Error	40	4,621	

Treatments	*Replications*
5 % = 2.18	5 % = 2.45
1 % = 2.99	1 % = 3.51

[a] Averages of six replications.
[b] Significant at 1 % level.

The increased forage yield could not have been due to the Hessian fly control, although this might account for a small part of it. As indicated in Table 2, there is no significant correlation between forage yield and Hessian fly control. Field observations tended to confirm this as the original or central stem was invariably the only part of the plant infested, the tillers appearing too late to become exposed to oviposition. The plants tillered heavily in both treatments and checks, averaging 8.7 tillers per plant. There was no significant difference on numbers of tillers between any treatments in December at the time records were taken on infestation.

TABLE 3. – *Residues of Thimet, calculated as p.p.m fully oxidized metabolite in plants, for five sampling dates and three levels of application.*

Date of sampling in 1956	Residue, in p.p.m., at level of		
	200 gm. per acre	800 gm. per acre	1600 gm. per acre
12 October	.046	.456	.507
19 October	.009	.093	.048
26 October	.000	.027	.013
2 November	.000	.014	.016
28 December	—	.000	.000

It would appear, therefore, that the increased growth most probably was due to incidental control of soil organisms by the phosphate insecticides. Observations at the time of ground preparation in June indicated a very low population of soil insects to be present.

Summary

The results of field tests indicate that systemic phosphate insecticides, when applied in a fertilizer mixture, are capable of controlling the Hessian fly at economical levels over a protective period of at least five weeks.

Data are presented which show that increased plant growth was obtained in the treated plots, as compared to checks, but the mechanism of this increase is uncertain.

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Decline of Satsuma Mandarin Oranges in Israel [1]

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TRISTEZA, after being found on Meyer lemon in Israel (5, 10) and then in Italy (9), has caused great concern among citrus growers in the Mediterranean region. The still more recent discovery of tristeza in Italy on the important Satsuma mandarin (9) has increased anxiety. It is therefore believed that the results of recent investigations of tristeza on Satsuma in Israel would be of interest to the whole of the Mediterranean region.

Two Satsuma varieties showing decline, Owari (Figure 2) and Wase, were tested for the presence of the tristeza infection. Owari is a common commercial variety and Wase is a variety found in a collection and is not commercially grown in Israel. Both varieties produce lopsided fruit (Figure 1). The Egyptian sour lime was used as the index plant, because it proved to be a suitable indicator for tristeza. [2] Sixteen trees of the Owari variety and three trees of the Wase were examined, and the results are summarized in Table 1.

As indicated by the results of the indexing tests, both varieties, Owari and Wase, were tristeza-free. Similar results were obtained in Texas by OLSON and MCDONALD (4), who tested 26 Satsuma varieties and found

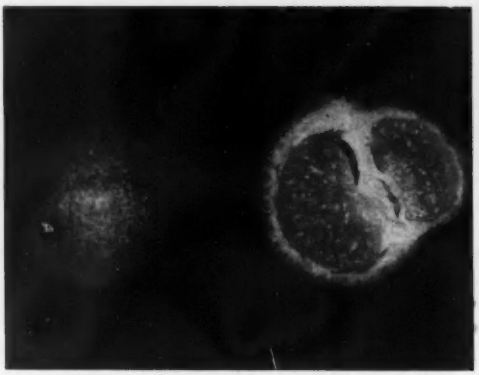

Figure 1. Lopsided fruit produced by the variety Owari of Satsuma mandarin on sour orange rootstock affected by xyloporosis.

[1] Publication of the Agricultural Research Station, Rehovot, 1957 Series No. 181-E.
[2] Unpublished data.

TABLE 1. – *Results on the indexing of Satsuma varieties Owari and Wase on Egyptian sour lime for tristeza infection.*

Variety [a]	Rootstock	Number trees examined	Number trees showing pitting on		Number trees showing inverse pitting on		Date of inoculation in 1956	Tristeza reaction
			Stock	Scion	Stock	Scion		
Owari	Sour orange	9	0	4	0	0	16 Aug.	negative
Owari	Sweet lime	3	3	0	0	3	16 Aug.	negative
Owari	Egyptian sour lime	4	4	4	0	0	23 Nov.	negative
Wase	Sour orange	3	0	0	0	0	14 Nov.	negative

[a] All trees of the two varieties included in the tests showed decline or poor growth, with lopsided fruit.

Figure 2. Decline of the variety Owari of Satsuma mandarin affected by xyloporosis. A. A 28-year-old affected tree on sour orange rootstock showing moderate decline. B. A 22-year-old affected tree on sweet lime rootstock showing severe decline.

nine of them including Owari to be free from tristeza infection. In a later investigation, OLSON (3) demonstrated that Wase was also tristeza-free. RUSSO (9) tested two Satsuma varieties in Italy, one from Acireale being tristeza-infected and the other from Paterno being tristeza-free. The exact identity of these two Satsuma varieties could not be given by RUSSO, therefore it is not known whether the declining Owari in Acireale reported in 1935 by CASELLA (1) is identical with the variety tested by RUSSO. Thus the cause of the decline described by CASELLA could not be determined. It is possible that this decline was due to the same cause which is responsible for the decline of Satsumas in Israel, as discussed subsequently. In view of the results obtained in Texas and Israel and without evidence to the contrary, Owari and Wase varieties are considered tristeza-free.

With the elimination of tristeza by the indexing tests mentioned above, the cause of the decline of Satsumas was still to be elucidated. A clue is provided in the data referring to the Owari variety grafted on sweet lime rootstock (Table 1). This rootstock is very susceptible to xyloporosis (8), showing distinct wood pitting, a symptom which does not occur on this stock infected with tristeza (2). Owari trees on sweet lime rootstock produce conoid pitting typical of xyloporosis on the stock and inverse pitting on the scion. The inverse pitting has often been associated with xyloporosis (7, 8). An additional symptom of xyloporosis, lopsided fruit (6), was also observed on these trees.

As shown in Table 1, Owari on sour orange rootstock was also affected with xyloporosis, as four of the nine trees examined had xyloporotic pitting on the scion and all trees had lopsided fruit. The absence of pitting on the sour orange rootstock was due to the resistance of this stock to the development of the particular type of symptom (8).

All four Owari trees on Egyptian sour lime showed pitting symptoms on both the stock and scion and produced lopsided fruit. This stock also developed pitting when grafted to xyloporosis-infected Shamouti sweet orange (8).

The Wase variety growing on sour orange rootstock displayed decline, but without the pitting symptom. This was true also in the majority of the Owari trees growing on sour orange. Nonetheless lopsided fruit were produced.

It may be concluded that the Owari and Wase varieties of Satsuma mandarin grown in Israel are tristeza-free and their decline is due to xyloporosis infection only, since the trees show all the symptoms characteristic of xyloporosis. This finding confirms the results obtained in Texas.

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Pellicularia filamentosa on *Tephrosia vogelii* and *Cajanus indicus* in Puerto Rico [1]

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A number of species in the genus *Tephrosia* are reported to have insecticidal properties. [2] One of these, *T. vogelii*, is being studied to determine its value as an insecticidal crop. Relatively few diseases are reported to attack this species, [2] and in previous trials in Puerto Rico, none of any importance was encountered. During the rainy season in the autumn of 1956, however, plots of *Tephrosia* growing at Mayaguez were damaged by infection of *Pellicularia filamentosa* (Pat.) Rogers. [3]

[1] The work was done in co-operation with the Tobacco and Special Crops Section, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland.

[2] ROARK, R.C. 1937. *Tephrosia* as an insecticide - a review of the literature. U.S. Dept. Agr., Bur. Ent. Plant Quarant., Div. Insecticide Invest. E-402.

[3] Identified by P.L. LENTZ and J.A. STEVENSON, National Fungus Collections, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland

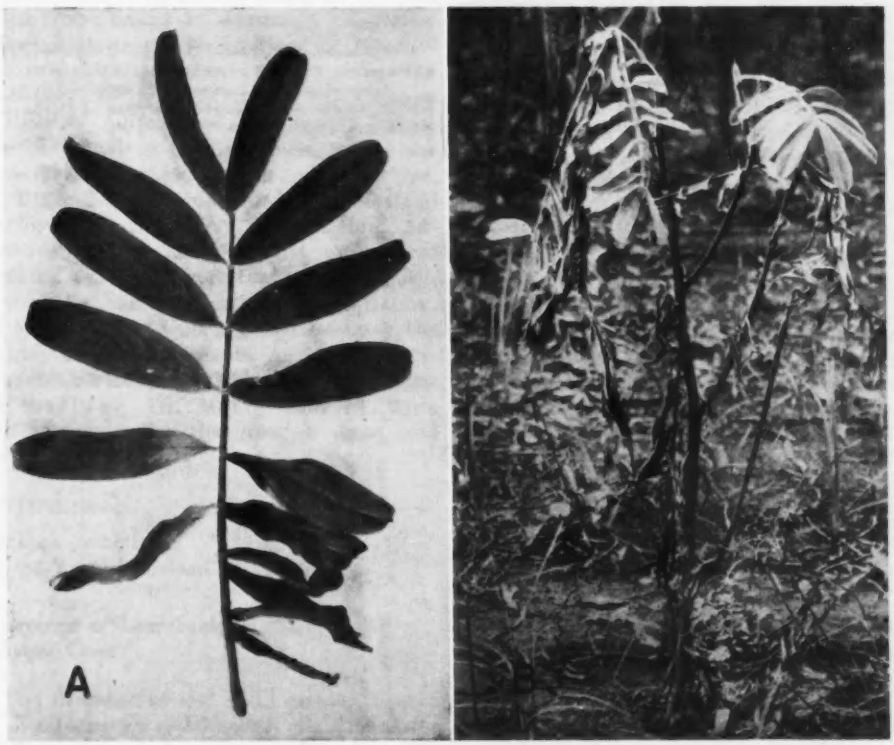

Figure 1. Tephrosia vogelii infected with Pellicularia filamentosa. A. Leaf showing primary infection on basal leaflets. B. Defoliating and stem-killing effects of the disease.

The disease caused defoliation and death of the young portions of the stems. Infections frequently commenced at lower leaflets (Figure 1, A), and the disease spread rapidly in both directions from the original point of infection by means of mycelia that grew on the surface of the host. Entire leaves and the young tender stems to which they were attached became diseased (Figure 1, B). When diseased and healthy tissues came in contact, such portions often adhered because of the dense mass of intertwining hyphae that quickly infected the healthy portion. The disease was confined to leaves and young stem tissue; no infection was observed on woody stems or at the base of any plants, even when these parts were artificially inoculated.

The fungus was isolated, and grew readily in culture. On several occasions healthy leaves were inoculated with mycelium of such cultures. The individual leaflets were folded over the inoculum and held together with scotch tape. In three days typical disease symptoms occurred on all inoculated leaves, and the check leaves were free of disease.

A disease similar to that on *Tephrosia* and caused by the same pathogen occurred in a plot of pigeon peas (*Cajanus indicus*) adjoining the *Tephrosia*. Infected materials from both hosts were obtained and used for inoculation studies. These materials not only incited the disease on the host from which they were obtained but were cross-pathogenic as well. This is not unusual, since *Pellicularia filamentosa* is reported to have a wide host range[4] and is the cause of important leaf diseases, for example, target leaf spot of Hevea rubber (*Hevea brasiliensis*).[5] It is of interest to note that Hevea rubber trees were grown in the vicinity of all the present *T. vogelii* plots.

The disease was controlled by spraying alternately with Bordeaux and zinc bisdithiocarbamate. The plots were treated twice weekly because of the heavy rainfall, which averaged about one-half inch per day during October. The spray program was stopped with the advent of dry weather, which occurred about the middle of November, and the disease was no longer a problem.

[4] ROGERS, D.P. 1943. The genus *Pellicularia* (Thelephoraceae). *Farlowia 1* : 95-118.

[5] STEVENSON, J.A., and J.B. CARPENTER. 1950. Herbarium records of *Pellicularia filamentosa* on Hevea rubber. *Plant. Dis. Reptr. 34* : 70.

Outbreaks and New Records

Cuba

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Negociado de Cuarentenas de Plantas
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White Stripe - A Virus Disease of Rice

WHITE stripe, a disease of virus origin, was first observed in Camagüey Province, and within the past few years it has spread rapidly throughout the whole country, seriously threatening rice production. It attacks all cultivated varieties of rice, but the local Honduras (Zayas Bazán) variety appears to be more tolerant than the varieties introduced from the United States. The disease causes mottles or chlorotic stripes along the veins on leaves; its characteristic symptoms are in some ways similar to those of rice stripe found in Japan.

Owing to the serious effects of this disease, two Japanese plant pathologists, Dr. H. MUKOO and Dr. T.T. IIDA, of the National Institute of Agricultural Sciences of Japan, have been invited to visit Cuba, under the sponsorship of three Cuban organizations, the Bank for Agricultural and Industrial Development, the Rice Stabilization Administration and the National Council of Economy. In collaboration with Ing. JULIÁN ACUÑA, Ing. FRANCISCO VALDÉS BARRY, and several other Cuban scientists from the Ministry of Agriculture, the Agricultural Experiment Station of Santiago de las Vegas and the Bank, Dr. MUKOO and Dr. IIDA have surveyed the rice-growing areas and have made preliminary investigations on the disease.

The results of these investigations confirmed that the white stripe disease is caused by a virus, similar to the rice stripe virus found in Japan. The Cuban virus is tentatively considered as an American strain of the rice stripe virus, since a disease similar to that found in Cuba has also been observed on rice in Panama and Venezuela.

As the rice stripe virus of Japan is transmitted by *Delphacodes striatella* Fall., it is suspected that the vectors of the Cuban disease are also leafhoppers. In Cuba, a species of *Delphacodes* which normally feeds on wild grasses in irrigation ditches, was found only in one rice plantation during the survey. Two species of *Sogata* occur in rice fields. *Sogata oryzicola* Muir is present in all the rice fields. *S. cubana* feeds mainly on wild rice and other gramineous plants but can be found on cultivated rice. Although *S. furcifera* Horv. was found to be incapable of transmitting the rice stripe disease in Japan, the possibility that the Cuban species of *Sogata* may act as vectors, especially *S. oryzicola*, is not to be excluded. The Agricultural Experiment Station, in co-operation with the Bank for Agricultural and Industrial Development, will initiate transmission studies of the disease, in order to determine the vector and its mode of transmission.

Martinique

Caribbean Commission
Port of Spain, Trinidad

Occurrence of Leaf Scald of Sugar Cane

The presence of leaf scald disease, caused by *Xanthomonas albilineans*, on sugar cane in Martinique has been confirmed. The disease is characterized by the appearance of sharply elongated, narrow white stripes on leaf blades. Severe symptoms were observed on variety B 34104.

The only part of America from which leaf scald has been reported is Brazil.

Plant Quarantine Announcements

French West Africa

Order No. 3619/SE of 10 April 1957, published in the *Journal officiel de l'A.-O.F.* No. 2883, 20 April 1957, prohibits the introduction of citrus originating from countries infested by tristeza disease.

The importation of living plants and parts thereof (except fresh fruit for consumption) of the genus *Citrus* from the following countries, which are regarded to be infested with tristeza or quick decline, is prohibited: the whole continent of America (N. America, C. America including adjacent islands, S. America), South Africa, Belgian Congo, Ghana, Australia, New Zealand, Hawaii, Java, Ceylon, Fiji, Israel and Cyprus.

In exceptional cases the High Commissioner may authorize the introduction of small quantities of citrus plants or parts thereof from infested countries for scientific, economical or technical reasons. The consignments must be certified by the qualified authorities of the country of origin as healthy and free from tristeza. The introduction will be made under the control of the Plant Protection Service and post-entry quarantine of six months will be required.

Poland

Order of the Ministry of Agriculture of 10 January 1955, published in the *Monitor Polski* No. 10 on 9 March 1955, regulates the import, export and transit of plants which for the purpose of the Order refer to fresh plants, parts thereof and seed.

Imports restricted

The following plant materials may be imported only if the shipment is accompanied by a certificate of health and origin issued by the exporting country, or if the Polish Plant Protection and Plant Quarantine Service has authorized the import. The certificate must state that the materials and their packing were found to be free from the specific pests and diseases mentioned in the Order and indicate the locality of origin.

1. Potatoes of all kinds. In the certificate required, an additional declaration should be included, stating that the field in which the potatoes were grown was free from Colorado beetle during the growing season and the preceding year, and that within a distance of 10 kilometers from the field no outbreak of potato wart disease occurred.
2. Cereal seeds for sowing or consumption.
3. Seeds of rape, tomato, cabbage and other crucifers as well as seeds of the pea family (Papilionaceae).
4. Small broad leaf trees and bushes as well as their scions and cuttings. In the certificate required, an additional declaration concerning potato wart disease as mentioned under potatoes should be included.
5. Subterranean parts of ornamental plants such as bulbs and rhizomes. In the certificate required, an additional declaration concerning potato wart disease as mentioned under potatoes should be included.
6. Any kind of fresh vegetables and parts thereof.
7. Apples, pears, bananas, oranges, lemons, grapefruits, mandarins, peaches, apricots, sour and sweet cherries, plums and tomatoes.

For the importation of the following seeds, an additional certificate issued by the official seed testing service of the country of origin, in Polish and the language of the country of origin, attesting that the seeds are free of *Cuscuta*, or an authorization of the Polish Seed Testing Service is required: clover, lucerne, serradella, kidneyvetch, white and yellow sweet clovers, crimson clover and flax.

For the importation of timothy grass, both the seed certificate issued by the country of origin and the authorization of the Polish Seed Testing Service are required.

The importation of leaves, potato peels and wastes, peels and wastes of fruits is prohibited except lemon peels and almond husks.

Packing

All consignments must be shipped in containers or wagons which were sealed by the plant protection service or seed testing service of the country of origin. Potatoes must be packed in new containers. Bulk shipments in ships must not be sealed.

Imports not requiring certification

The following plant materials may be imported without phytosanitary certificates:

1. Small packages, up to 1 kilogram, of vegetable seeds (except legume seeds), some fruits and tomatoes.

2. Small packages, up to 0.5 kilogram, of hyacintn bulbs.
3. Any seed, and bulbs and rhizomes except potatoes, up to 1 kilogram, as samples or for scientific purpose.
4. In individual cases as authorized by the Ministry of Agriculture, any plant for scientific purposes in authorized quantity.

Transit

For consignments in transit the regulations for import are applicable, except where the goods are in sealed wagons and are not reloaded in Poland, where they are in sealed containers, or where they are reloaded in a Polish port into sealed wagons.

Prohibited pests and diseases

Pseudaulacaspis pentagona
Ceresa bubalus
Hyphantria cunea
Laspeyresia molesta
Eriosoma (Schizoneura) lanigerum
Phylloxera vastatrix
Quadraspidiotus (Aspidiotus) perniciosus
Rhagoletis pomonella
Cetatitis capitata
Leptinotarsa decemlineata
Phthorimaea operculella
Calandra oryzae
Bruchophagus gibbus
Bruchus pisorum
Bruchus obsoletus (B. obtectus)
Bruchus affinis
Bruchus quadrimaculatus
Spermophagus subfasciatus
Heterodera rostochiensis
Solanum viruses 1, 2, 14, and mixture
Humulus viruses 1-4
Phaseolus viruses 1 and 2
Aplanobacter michiganense
Bacterium flaccumfaciens
Bacillus amylovorus
Pseudomonas hyacinthi
Bacterium translucens undulosa
Bacterium atrofaciens
Synchytrium endobioticum
Botrytis authophila
Sphaerella linorum (Phlyctaena linicola)
Ascochyta linicola
Sorosporium reilianum
Tuburcinia tritici
Diplodia zeae
Tilletia pancicii
Phoma lingam

United States

Foreign Plant Quarantine No. 37 concerning nursery stock, plants and seeds was further amended by two notices, published in the *Federal Register* Vol. 21, No. 209, 26 October 1956 and Vol. 21, No. 237, 7 December 1956, with regard to the post-entry quarantine of *Rhododendron* spp., including azaleas (evergreen plants of all species and varieties and any deciduous species or varieties in foliage) (see *FAO Plant Prot. Bull. 4* : 175). These amendments exempt *Rhododendron* spp. of the categories designated, imported from the Netherlands and Belgium, from the post-entry quarantine requirement. This measure was taken because conclusive evidence has been acquired that the rust, *Chrysomyxa ledi* var. *rhododendri*, does not occur in the Netherlands and Belgium and that the entry of the rust into these two countries is being prevented by adequate quarantine operations.

News and Notes

Conference on Citrus Virus Diseases

As part of the 50th anniversary celebration of the University of California Citrus Experiment Station, plans are being formulated for a Conference on Citrus Virus Diseases to be held at Riverside, California, 18-22 November 1957. The program will consist of two days for symposia and formal presentation of papers, one day of guided tours of the Citrus Experiment Station field experiments, two days of tours to other citrus areas of California, and a return to the Riverside campus to permit visitors to consult with staff members of the station and to observe experimental work of their choice.

In addition to the investigators in the United States, research workers from many citrus-producing countries of the world have been invited to attend the Conference. A tentative program, which appears to offer a well-rounded coverage of citrus virus diseases, has been circulated. Among the citrus virologists from other countries who have been invited to present papers are I. REICHERT of Israel, L. FRASER and R.J. BENTON of Australia, A.S. COSTA and S. MOREIRA of Brazil, S. YAMADA and K. SAWAMURA of Japan, and P.C.J. OBERHOLZER and A.P.D. MCCLEAN of South Africa.

Further enquiries about the Conference should be addressed to Dr. J.M. WALLACE, Department of Plant Pathology, University of California, Riverside, California, U.S.A.

ISO Meeting on Common Names for Pest Control Chemicals

The second meeting of the Technical Committee on Common Names for Pest Control Chemicals of the International Organization for Standardization (ISO) will be held in London, 18-20 September 1957.

During the first meeting held in 1955, principles for the selection of common names were adopted and preliminary approval was given to names of a number of pesticides in wide use. The forthcoming meeting will review the second draft list of common names which has been circulated for comment and will consider proposals for further common names of pesticides in extensive use.

For further information, enquiries should be addressed to the Secretariat of the Committee, British Standards Institution, 2, Park Street, London W. 1, England.

Robigo - A New Journal on Cereal Rusts

Robigo, an international quarterly journal devoted to news on cereal rusts, is published in accordance with a proposal made at the Third International Wheat Rust Conference held in Mexico in March 1956. The first number appeared in September 1956. Articles, mostly in the form of brief notes, are published in English and Spanish and occasionally in other languages used by the contributors, covering all aspects of research in connection with cereal rusts as well as the development of rust epidemics in various countries.

The editor of this journal is Ing. Agr. José VALLEGA, Instituto de Fitotecnica, Castelar, Argentina, from whom further information may be obtained.

Revised List of Plant Quarantine Services

In order to facilitate direct contact between national agencies concerned with plant quarantine, three lists of national plant quarantine services have been published (*FAO Plant Prot. Bull. 2* : 126-128. 1954; *3* : 160. 1955; *5* : 33-36. 1956). In view of the need for frequent revisions and of the limitation of space in this *Bulletin*, a new list was issued separately in May 1957, containing names and addresses of governmental agencies responsible for the administration of plant quarantine in 76 countries and territories, as well as the names of officers in charge. This new list has been circulated to all governmental agencies included therein and is obtainable from the Plant Production Branch, Agriculture Division, FAO, Rome, Italy.

Roma - Tip. del Senato del dott. Giovanni Bardi